Cotton Mice, *Peromyscus gossypinus* LeConte (Rodentia: Cricetidae), in the Great Dismal Swamp and Surrounding Areas

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ABSTRACT—Livetrapping of small mammals was conducted in the Great Dismal Swamp and other areas of North Carolina in 1990. Five *Peromyscus gossypinus* were caught in the Dismal Swamp proper, and 42 were caught in the Chowan Swamp adjacent to the Dismal Swamp. These are the first published records of *P. gossypinus* taken in the Dismal Swamp region since the 1930s.

Rose et al. (1990) suggested that the cotton mouse, *Peromyscus gossypinus* LeConte, could be extinct in the Great Dismal Swamp of Virginia and North Carolina. With the exception of two specimens collected in 1933 by Dice (1940), virtually none has been captured there since the turn of the century despite the efforts of Handley (1979) in the 1950s and Rose et al. (1990) in the 1980s. Our recent collections and genetic analyses show *P. gossypinus* exists in the Dismal Swamp, and that based on capture rate it is uncommon in the Swamp proper, but is relatively abundant in areas adjacent to the southern section of the Swamp.

Separating *P. gossypinus* from *P. leucopus* Rafinesque (white-footed mouse) can be difficult both for live and museum specimens. Dice (1940) states that in eastern Virginia size characteristics but not color can be used to separate these species. Our studies (unpublished data) show that several cranial and external characters from adult specimens are required for consistent species identification with discriminant analysis. However, a fixed allozyme difference at the Glucose-6-Phosphate Isomerase locus (GPI or PGI, Enzyme Commission No. 5.3.1.9), and nearly fixed differences at the Albumin and alpha-Glycerolphosphate dehydrogenase (a-GPD or GPD), Enzyme Commission No. 1.1.1.8) loci separate these two species (Price and Kennedy 1980; Robbins et al. 1985; Boone 1990; Boone unpublished data).

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METHODS

We captured small mammals with Sherman livetraps in northeastern North Carolina for studies examining subspecific affinities, population genetics, and Lyme disease (Magnarelli et al. 1992) in *P. gossypinus*. On 26 and 27 April 1990, we trapped in the Dismal Swamp along Highway 158 from 6.3 to 10.6 km east of Highway 32 (east of Sunbury, Gates County, North Carolina) for 587 trapnights. On 13 June 1990, we placed 200 traps in the Chowan Swamp between 2.9 and 5.3 km south of Gatesville (Gates County, North Carolina). On 28 and 29 April 1990, we trapped along the Cashie River in and around Windsor (Bertie County, North Carolina) for 350 trapnights, and we placed 150 traps in and around Richlands (Onslow County, North Carolina) on 30 April 1990.

Locations of trap lines and specific traps were selected to maximize the capture of *P. gossypinus* based on our understanding of its habitat preference and ecology learned from the capture of more than 2,100 cotton mice from throughout its entire range. Although these mice can be caught almost anywhere, they seem to exist in highest densities in thick, undisturbed (anthropogenic or natural), seasonally flooded, riparian woodlands near water. On coastal barrier islands where these habitats do not exist, they seem to occur most densely in undisturbed old-growth oak-palmetto (*Quercus* sp. and *Serenoa repens*) forests. Traps were set on, in, and under logs, in trees, under stumps, in the rotten bases of trees, on the edges of ponds, on floating debris in flooded forests, as well as in old buildings and trash piles. More than one trap was set in particularly promising sites.

We used allozyme markers to identify the *Peromyscus*. Genetic analysis was performed with standard horizontal starch gel electrophoretic and protein staining techniques on blood, liver, and muscle for 42 enzyme and protein loci. Techniques were similar to those of Selander et al. (1971) as described in Boone (1990).

Body mass was measured to the nearest 0.1 g. Age (juvenile, subadult, or adult) was determined by pelage color, and reproductive status was determined by examination of external and internal reproductive structures. Non-adult and pregnant females were deleted from morpholo-gical comparisons.

RESULTS

Peromyscus gossypinus was captured in each of the four areas examined, and *P. leucopus* was captured in all areas except Richlands (Table 1). Additionally, one golden mouse (*Ochrotomys nuttalli* Harlin) and one juvenile Virginia opossum (*Didelphis virginiana*

Table 1. *Peromyscus gossypinus* and *P. leucopus* captured in North Carolina, 1990.

Location	Species			
	P. gossypinus		*P. leucopus*	
	Number caught	Captures/ 1,000 trapnights	Number caught	Captures/ 1,000 trapnights
Gates County Dismal Swamp	5	8.5	27	46.0
Gates County Chowan Swamp	42	210.0	2	10.0
Bertie County Windsor	33	94.3	5	14.3
Onslow County Richlands	42	280.0	0	0.0

Kerr) were captured in the Dismal Swamp, and one *Blarina* was captured at Windsor.

We found that Dice's (1940) suggestion that these *Peromyscus* species can be distinguished by size is not strictly true. Our comparison of genetic markers and morphology indicates that although *P. gossypinus* tends to be larger and heavier than *P. leucopus*, there is considerable overlap. For the mice caught east of Sunbury, body mass of *P. gossypinus* ranged from 20.9 to 35.5 g ($\bar{x}$ = 26.3 g, n = 5), whereas *P. leucopus* ranged from 14.6 to 24.6 g ($\bar{x}$ = 19.1 g, n = 26). In the Chowan Swamp, body mass of *P. gossypinus* ranged from 17.1 to 36.8 g, ($\bar{x}$ = 25.9 g, n = 42); the one adult P. leucopus weighed 15.9 g. In the Windsor area, *P. gossypinus* ranged from 19.2 to 37.9 g ($\bar{x}$ = 28.4 g, n = 22), and *P. leucopus* ranged from 17.1 to 24.1 g ($\bar{x}$ = 20.4 g, n = 4). The *P. gossypinus* from Richlands ranged from 21.2 to 39.4 g ($\bar{x}$ = 29.2 g, n = 33). Therefore, if Rose et al. (1990) used size to identify *Peromyscus*, some of the specimens identified as *P. leucopus* by might actually have been *P. gossypinus*.

DISCUSSION

Our results probably differ those of Rose et al. (1990) as a result of different trapping location, design, and methods. In the southern portion of the Dismal Swamp, Rose et al. (1990) used pitfall traps set on a grid. We used only Sherman livetraps, and our collection locations were selected to target habitats thought to be optional for *P. gossypinus* without concern for determining density or other demographic parameters. Therefore, we were not confined to a grid, and we were able to trap in areas, and place traps in sites, that would be inappropriate to use with pitfall traps in a demographic study. Furthermore, our trapping was only conducted in the southernmost part of

the Swamp, an area more accessible to migrants from the Chowan Swamp where *P. gossypinus* is abundant, whereas the majority of Rose et al.'s (1990) effort was concentrated in the northern section of the Swamp where *P. gossypinus* might be absent.

Although *P. gossypinus* is abundant in areas near the Dismal Swamp, it is probably not currently abundant in the swamp proper. Handley (1979) stated that *P. gossypinus* densities fluctuate widely in the Swamp, and this population could simply be at a low point in its cycle. This species now occurs in the Great Dismal Swamp, but current management practices in the Great Dismal Swamp National Wildlife Refuge that promote clearings and vegetational heterogeneity might endanger it because we have observed that *P. gossypinus* occurs in greatest density in mature, undisturbed riparian forests.

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